



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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Pre-Amend A  
3.21.02  
*RJM*  
*RECEIVED* **PATENT**

FEB 11 2002  
1C 2982.1US MAIL ROOM

**In re Application of:**

Salman Akram

**Serial No.:** 09/989,341

**Filed:** November 20, 2001

**For:** MULTIPLE DIE STACK APPARATUS  
EMPLOYING T-SHAPED INTERPOSER  
ELEMENTS

**Examiner:** Unknown

**Group Art Unit:** Unknown

**Attorney Docket No.:** 2982.1US (96-712.1)

CERTIFICATE OF MAILING

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PRELIMINARY AMENDMENT

Commissioner for Patents  
Washington, D.C. 20231

Sir:

Please revise the above-identified application as follows:

IN THE CLAIMS:

Claims are presented below in format for publication. Claims 1-4, 9-12, 14 and 15 have been amended. Please enter these claims as amended. Attached is Appendix A, which contains a marked-up version of the claims as revised.

1. (Amended) A method of forming a multiple semiconductor device stack apparatus comprising:

providing a substrate;

providing a first semiconductor device having at least one bond pad on an active surface thereof;

mounting and electrically connecting said first semiconductor device to said substrate;

providing a first interposer device;

mounting said first interposer device to said first semiconductor device, on a side opposite said substrate, said first interposer device having a first surface of a first area and a second surface of a second area less than said first area with a first pair of recesses formed on opposing edges of said first interposer device thus exposing said at least one bond pad on said active surface of said first semiconductor device, said second surface mounted to said active surface of said first semiconductor device;

providing a second semiconductor device; and

mounting said second semiconductor device on said first surface of said first interposer device, opposite said first semiconductor device and electrically connecting said second semiconductor device to either said first semiconductor device or to said substrate or both.

2. (Amended) The method of forming a multiple semiconductor device stack apparatus according to claim 1, further comprising:

providing a second interposer device having a first side and a second side; and

mounting said second interposer device to said second semiconductor device on said first side, wherein said second interposer device includes a bond pad recess opening for allowing connection between either said first and second semiconductor devices or between said semiconductor devices and said substrate or both.

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3. (Amended) A method of forming a multiple semiconductor device stack apparatus comprising:
- providing a substrate;
- providing a first semiconductor device having at least one bond pad on an active surface thereof;
- mounting and electrically connecting said first semiconductor device to said substrate;
- providing a first thermally conductive interposer device;
- mounting said first thermally conductive interposer device to said first semiconductor device, on a side opposite said substrate, said first thermally conductive interposer device having a first surface of a first area and a second surface of a second area less than said first area with a first pair of recesses formed on opposing edges of said first thermally conductive interposer device thus exposing said at least one bond pad on said active surface of said first semiconductor device, said second surface mounted to said active surface of said first semiconductor device;
- providing a second semiconductor device; and
- mounting said second semiconductor device on said first surface of said first thermally conductive interposer device, opposite said first semiconductor device and electrically connecting said second semiconductor device to either said first semiconductor device or to said substrate or both.

4. (Amended) The method of claim 3, further comprising:

providing a second interposer device having a first side and a second side; and

mounting said second interposer device to said second semiconductor device on said first side thereof, wherein said second interposer device includes a bond pad recess opening for allowing connection between either said first and second semiconductor devices or between said semiconductor devices and said substrate or both.

5. The method of claim 4, wherein said second interposer device comprises a thermally conductive interposer.

6. The method of claim 4, wherein said second interposer device comprises a thermally insulative interposer.

7. The method of claim 4, wherein said second interposer device comprises a thermally conductive and thermally insulative interposer.

8. The method of claim 3, wherein said first thermally conductive interposer device includes a thermally insulative portion.

9. (Amended) A method for forming a stack of multiple semiconductor devices comprising:

providing a substrate;

providing a first semiconductor device having at least one bond pad on an active surface thereof; mounting and electrically connecting said first semiconductor device to said substrate;

providing a first interposer device;

mounting said first interposer device to said first semiconductor device, on a side opposite said substrate, said first interposer device having a first surface of a first area and a second surface of second area less than said first area with a first pair of recesses formed on opposing edges of said first interposer device thus exposing said at least one bond pad on said active surface of said first semiconductor device, said second surface mounted to said active surface of said first semiconductor device;

providing a second semiconductor device; and

mounting said second semiconductor device on said first surface of said first interposer device, opposite said first semiconductor device and electrically connecting said second semiconductor device to either said first semiconductor device or to said substrate or both.

10. (Amended) The method of claim 9, further comprising:  
providing a second interposer device having a first side and a second side; and  
mounting said second interposer device to said second semiconductor device on said first side,  
wherein said second interposer device includes a bond pad recess opening for allowing  
connection between either said first and second semiconductor devices or between said  
semiconductor devices and said substrate or both.

11. (Amended) A method of forming a stack of semiconductor devices comprising:  
providing a substrate;  
providing a first semiconductor device having at least one bond pad on an active surface thereof;  
mounting and electrically connecting said first semiconductor device to said substrate;  
providing a first thermally conductive interposer device;  
mounting said first thermally conductive interposer device to said first semiconductor device, on  
a side opposite said substrate, said first thermally conductive interposer device having a  
first surface of a first area and a second surface of a second area less than said first area  
with a first pair of recesses formed on opposing edges of said first thermally conductive  
interposer device thus exposing said at least one bond pad on said active surface of said  
first semiconductor device, said second surface mounted to said active surface of said  
first semiconductor device;  
providing a second semiconductor device; and  
mounting said second semiconductor device on said first surface of said first thermally  
conductive interposer device, opposite said first semiconductor device and electrically  
connecting said second semiconductor device to either said first semiconductor device or  
to said substrate or both.

12. (Amended) The method of claim 11, further comprising:  
providing a second interposer device having a first side and a second side; and  
mounting said second interposer device to said second semiconductor device on said first side  
thereof, wherein said second interposer device includes a bond pad recess opening for  
allowing connection between either said first and second semiconductor devices or  
between said semiconductor devices and said substrate or both.

13. The method of claim 12, wherein said second interposer device comprises a  
thermally conductive interposer.

14. (Amended) The method of claim 12, wherein said second interposer device  
comprises a thermally insulative interposer.

15. (Amended) The method of claim 12, wherein said second interposer device  
comprises a thermally conductive and thermally insulative interposer.

16. The method of claim 11, wherein said first thermally conductive interposer device  
includes a thermally insulative portion.

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**REMARKS**

No new matter has been added. The Applicant requests entry of the foregoing amendment prior to examination of the application on the merits.

Respectfully submitted,



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